

# NOTES: DOMAIN AND RANGE

DAY 3

Textbook Chapter 2.1

**OBJECTIVE:** Today you will learn about domain, range, and continuity!

**Domain:** The set ( ) of all inputs (x-values) of a function.

**Range:** The set ( ) of all outputs (y-values) of a function.

Use the graph of each function to find its domain and range in interval AND inequality notation.

<p>1.</p> <p>Domain: _____</p> <p>Domain: _____</p> <p>Range: _____</p> <p>Range: _____</p>	<p>2.</p> <p>Domain: _____</p> <p>Domain: _____</p> <p>Range: _____</p> <p>Range: _____</p>	<p>3.</p> <p>Domain: _____</p> <p>Domain: _____</p> <p>Range: _____</p> <p>Range: _____</p>
<p>4.</p> <p>Domain: _____</p> <p>Range: _____</p>	<p>5.</p> <p>Domain: _____</p> <p>Range: _____</p>	<p>6.</p> <p>Domain: _____</p> <p>Range: _____</p>

7) Select all of the following equations that have domain of all real numbers and a range of  $[-2, \infty)$

a)  $f(x) = \frac{1}{2}|x+3| - 2$

b)  $g(x) = 3x - 2$

c)  $y = 2(x-3)^2 - 2$

d)  $h(x) = \sqrt{x-3} - 2$

e)  $f(x) = x^3 - 2$

f)  $g(x) = \sqrt[3]{x+4} - 2$

# NOTES: CONTINUITY

**Continuity:** A function is continuous if there are no breaks in the graph.

**Point Discontinuity:** If it is discontinuous at a single point.

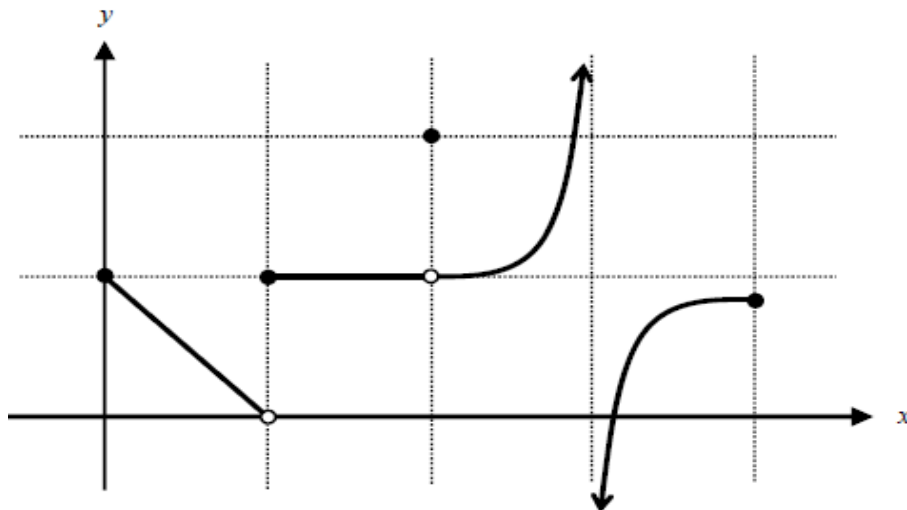
**Jump Discontinuity:** If a function approaches two different values from both sides of the discontinuity.

**Asymptotic Discontinuity:** The function approaches a line, called an asymptote, but never reaches it.

1. Using the graph below, determine if the graph is continuous.

x-coordinate of continuity	Type of Discontinuity

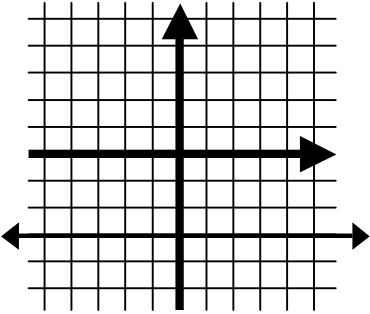
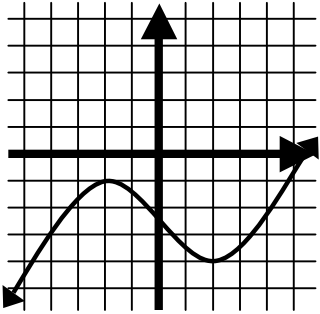
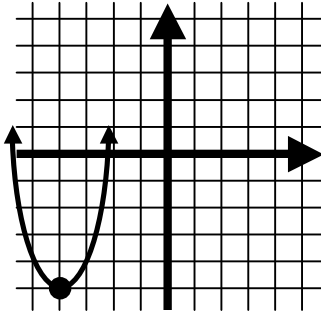
2. Then label each discontinuity on the graph.



# PRACTICE: DOMAIN AND RANGE

DAY 3

Use the graph to state the domain and range of each function (in INTERVAL NOTATION)

<p>1.</p>  <p>Domain: _____</p> <p>Domain: _____</p> <p>Range: _____</p> <p>Range: _____</p>	<p>2.</p>  <p>Domain: _____</p> <p>Domain: _____</p> <p>Range: _____</p> <p>Range: _____</p>	<p>3.</p>  <p>Domain: _____</p> <p>Domain: _____</p> <p>Range: _____</p> <p>Range: _____</p>
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4. Use the calculator to identify all functions with a domain of all real numbers:

$f(x) = x^2$

$f(x) = \sqrt{x}$

$f(x) = 4 - 3x$

$f(x) = |x - 4| + 5$

5. Identify all functions with the same range as:  $f(x) = x^2 + 5$

$f(x) = 2x + 5$

$f(x) = \sqrt{x} + 5$

$f(x) = x^3 + 5$

$f(x) = (x + 5)^2$

**State the domain and range of each function below.** Use the calculator. *(Sketch your graph next to the equation)*

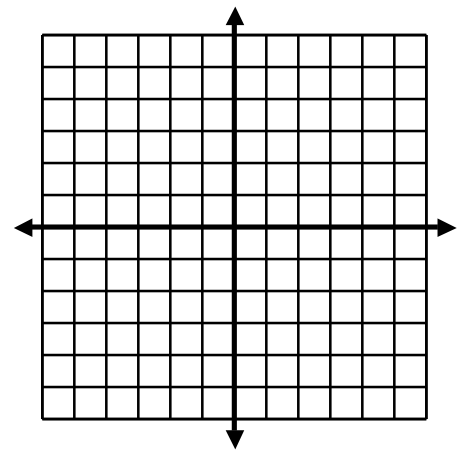
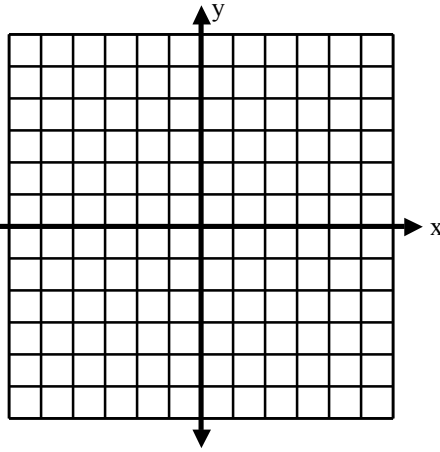
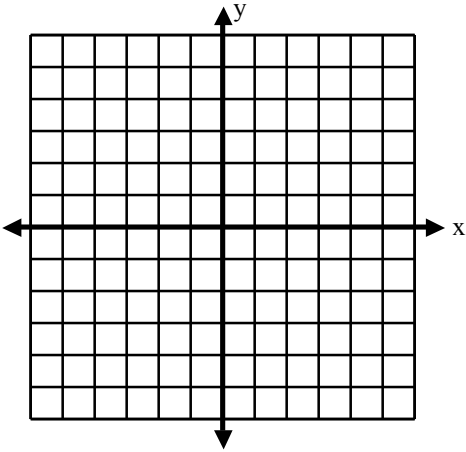
<p>6. <math>y = \sqrt{x+2} + 5</math></p>	<p>7. <math>y = x^2 + 1</math></p>	<p>8. <math>y = 2^x</math></p>	<p>9. <math>y = - x + 1  - 3</math></p>
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10) Use a calculator to graph. State the domain, range, and zeros of the function (if they exist).

a)  $y = -\sqrt{x+3} + 2$

b)  $y = (x-2)^3 - 3$

c)  $y = 2(x+1)^2 - 4$



D: \_\_\_\_\_  
R: \_\_\_\_\_  
Zeros: \_\_\_\_\_

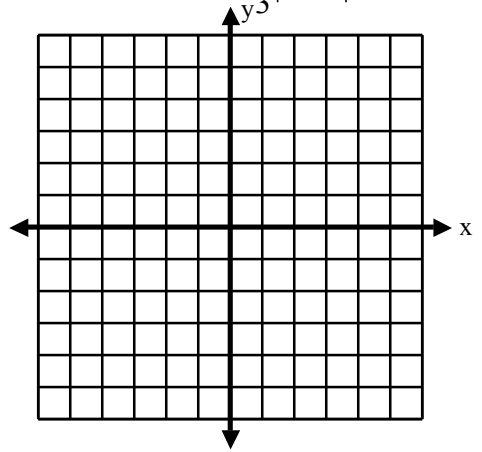
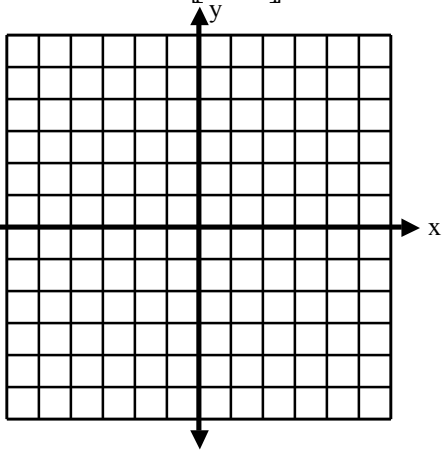
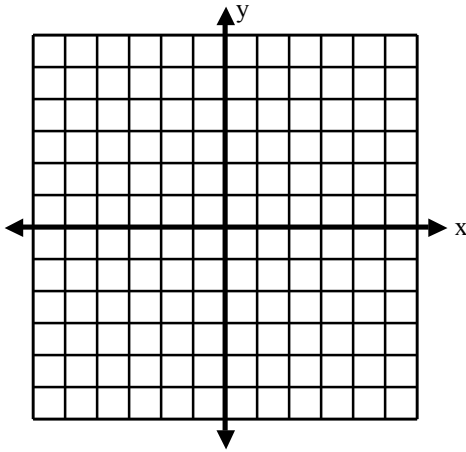
D: \_\_\_\_\_  
R: \_\_\_\_\_  
Zeros: \_\_\_\_\_

D: \_\_\_\_\_  
R: \_\_\_\_\_  
Zeros: \_\_\_\_\_

d)  $f(x) = \sqrt[3]{x+2} - 1$

e)  $g(x) = \lceil x+4 \rceil - 2$

f)  $h(x) = -\frac{2}{y^3}|x-2| + 5$



D: \_\_\_\_\_ R: \_\_\_\_\_

D: \_\_\_\_\_ R: \_\_\_\_\_

D: \_\_\_\_\_ R: \_\_\_\_\_

**Multiple Choice: Choose the best answer for each question.**

<p>4. What is the domain of <math>y = \sqrt{x+2}</math>?</p> <p>A. <math>(-\infty, \infty)</math> B. <math>(-\infty, 0]</math> C. <math>[0, \infty)</math> D. <math>[2, \infty)</math></p>	<p>5. Which function's range is the interval <math>(-\infty, 4]</math>?</p> <p>A. <math>y = -(x-4)^2</math> B. <math>y = 3(x-4)^2</math> C. <math>y =  x  + 4</math> D. <math>y = -5 x  + 4</math></p>
<p>6. Which function has a range of all real numbers?</p> <p>A. <math>y = 3^x + 1</math> B. <math>y = 3x + 1</math> C. <math>y = \sqrt{x-3}</math> D. <math>y =  x-3 </math></p>	<p>7. Which function has a domain of all real numbers?</p> <p>A. <math>y = \frac{2}{x}</math>                      B. <math>y = x^3 + 6</math> C. <math>y =  x-2  - 1</math>            D. <math>y = \frac{5}{x^2 - 1}</math></p>